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ABSTRACT

A procedural model is presented for the construction and validation of an attitude scale in vocational education; and the results of an instrumentation study using that model are discussed. The three-stage model is composed of: (1) stratification of the construct; (2) item construction and selection; and (3) item cluster analysis. In phase one, the following steps are used: defining the universe of the construct; listing the major components; subdividing each component thoroughly; editing to eliminate duplications and ambiguities; and submitting stratification for expert review. For phase two, the following procedure is used: building an item bank; insuring accuracy of meaning; editing the items; submitting items for expert review; administering the trial instrument; doing statistical analysis of the results and of the correlation of each item with all component subscores and with the total score; and selecting items for the final test form. For phase three, the procedure is composed of: administering the instrument to a second subset of the target population; computing item-to-subscore and item-to-total score correlations; and performing additional item-to-subscore correlations. (MH)

Development of An Attitude Scale for Vocational Research A Systematic Approach

by

William G. Camp*

Of all the tasks vocational educators are called upon to perform, surely on of the most difficult is evaluation. Evaluative research in vocational education has generally centered around job placement, competence, skill mastery, completions, and other similar criteria. However, legitimate research questions periodically arise in vocational education which can only be answered in the affective area. Unfortunately, measurement of attitudes may well be the most difficult type of evaluation. As a further complication, until recently, attitude instrument development techniques had not progressed to the level of sophistication or simplicity of the achievement test and manipulative instrument test construction procedures. More often than not, affective measures have been developed by the researcher compiling a pool of items, subjectively selecting the items for use and then submitting the instrument to a panel of judges for validation. Clearly, a systematic approach to instrument development and validation for attitude measurement is needed.

The purpose of this paper is to present a simplified, step-by-step procedural model for the construction and validation of one type of attitude scale and the results of an instrumentation study which utilized that model.

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BACKGROUND

Crespi (1965) defined attitudes as a "predisposition to behave in specific ways to specific stimuli," thus accounting for the tendency of people to behave in a generally consistent manner. He further contended that even a simple object may be regarded as consisting of a number of elements or component parts, each of which may be the subject of varying attitudes.

Remmers (1954) provided another definition of attitude as "an effectively toned idea or group of ideas predisposing the organism to action with reference to specific . . . objects." He theorized that attitudes are a component of all behavior, overt as well as covert. Remmers further enumerated several assumptions generally made by attitude researchers:

1. attitudes are measurable
2. they vary along a linear continuum
3. attitudes are common to a group
4. attitudes are held by many people
5. they are temporary and changeable
6. they are subject to rationalization and deception

In addition, Remmers described several types of instruments used to measure attitudes:

1. A-priori scales
2. psycho-physical scales
3. sigma scales
4. master scales
5. behavior scales
6. summated scales

Kerlinger (1964) discussed several alternative techniques available for validation of such instruments as the summated (or Likert-type) scale described by Remmers, above.

content validity,

predictive or concurrent validity, &

construct validity

He indicated that content validation was best used in construction of achievement instruments and that construct validation was appropriate in attitude scale construction.

Bohrnstedt (1970) argued that the approach of content validation could prove much more useful than it had in construction of attitude scales. He developed a three stage model for the construction and content validation of attitude scales:

1. stratification of the construct
2. item construction and selection
3. item cluster analysis

In stage one, the universe of the attitude scale is defined. Then, the domain is stratified into its major components with a critical concern that the strata broadly encompasses the entire construct. Each component, or stratum, is then subdivided into what Bohrnstedt called substrata. The substratification is then continued until the outline exhausts the content of the universe. In essence, the product of stage 1 is a detailed outline of the construct which the attitude scale is to measure.

Stage two is the construction of items to "capture the shades of meaning associated with each stratum and substratum." Bohrnstedt contends that a minimum of seven to ten items should be written for each stratum. Although this point is not specifically considered, it would appear that if the substratification is fairly detailed, the requirement for the number of items would be met if the main stratum, or component, contained the seven to ten items, rather than each substratum.

The third stage calls for cluster analysis of items after initial data have been gathered. The purpose here is to determine whether each stratum is relatively homogeneous and relatively independent of each of the other strata. This can be accomplished by either of two separate methods, both of which will be delineated in the next section of the paper.

It would appear that Bohrnstedt's model provides not only content validation but also construct validation. It forces a detailed delineation of the constrct being studied by a review of the theory underlying that construct as it is presented in the literature. Further, the item cluster analysis technique, while differing from factor analysis in approach, somewhat resembles factor analysis in result. In factor analysis, the pool of items is broken down into spatially related factors. In this cluster analysis technique, the "factors," or strata, are derived logically as a result of the literature research, and the statistical treatment of the data is done to verify the homogeneity of each stratum. Indeed, having developed a basic instrument by Bohrnstedt's methodology, thereby establishing both content validity and construct validity, further treatment of the instrument by factor analysis techniques might serve to provide further evidence of construct validity.

INSTRUMENT CONSTRUCTION PROCEDURE

The procedure outlined here represents an application and expansion of Bohrnstedt's technique and is based upon experiences of the author in development of the instrument being described partially in this section amd more fully in the RESULTS section.

Phase I - stratification of the construct.

1. Define in detail the universe of the construct to be measured.

In the case of career education, any number of definitions can be found. For the purpose of this particular study, the following definition was used: "a comprehensive educational (approach) focused on careers, which begins at grade one, or earlier, and continues through the adult years".

2. Break the construct down into its major strata or components.

Again, career education has been delineated in numerous ways and no clear consensus exists concerning the precise nature and labels of all its major components. For the purpose of this study, career education was assumed to consist of five major strata as shown in figure 1.

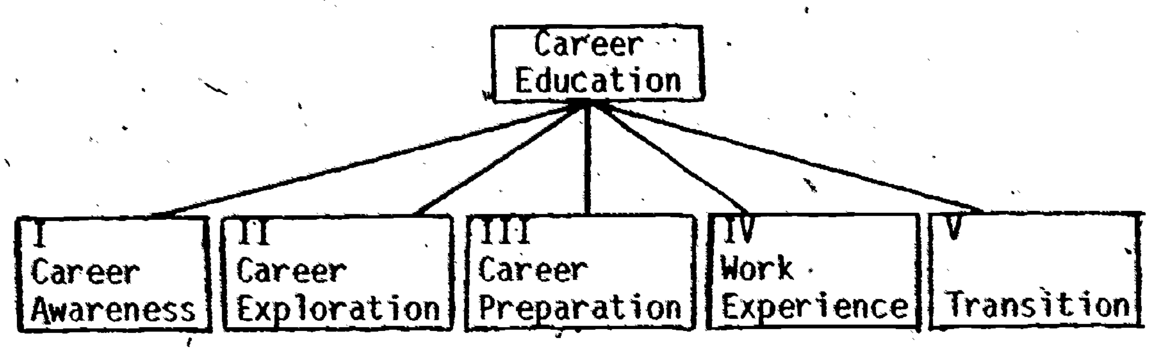

figure 1 - Strata of Career Education

3. Subdivide each stratum into substrata.

Each component (or stratum) of career education was further broken down (substratified) in terms of general developmental realms of expected student outcomes as follows: (A) self-concept and social development, (B) world of work, (C) education, and (D) decision-making and problem-solving. This step was derived largely from earlier works by Asche (undated) and by Bailey and Stadt (1973) and resulted in a 4 X 5 matrix which hopefully represents all the general areas of expectations of career education in terms of student outcomes - see figure 2.

	I Career Awareness	II Career Exploration	III Career Preparation	IV Work Experience	V Transition
A. Self-Concept and Social Development					
B. World of Work					
C. Education					
D. Decision-Making and Problem-Solving					

figure 2 - Matrix representing Career Education

4. Continue this process to exhaust the universe of the construct.

For each cell in the matrix, one or more specific expected student outcomes were delineated, as in figure 3.

Cell V, A

	V Transition
A Self-concept and Social Development	1. refinement of self-concept based upon continued occupational, family and social experience 2. active pursual of employment 3. . . .

figure 3 - Excerpt from Substratification of Transition Stratum, Camp (1977)

5. Edit the stratification to eliminate duplications and ambiguities

6. Submit the stratification to a panel of judges to determine whether it accurately and exhaustively delineates the construct to be

measured.

Phase I will be the basis upon which the argument of content validity will be made.

Phase II - item construction and selection

1. Build a pool of items

As in the development of any Likert-type scale, the items were written as short statements or opinion relative to some aspect of the construct of career education. Each item was intentionally written to express a judgement rather than factual information. Items were collected from a number of traditional sources including both pro and con statements suggested by career education literature, teachers, administrators, university specialists, graduate students, and so forth. In each case, the statement was classified as either favorable or unfavorable toward the general tenets of career education and a corresponding statement expressing the opposite viewpoint was written. The result was a pool of bipolar items - i.e. one version in the negative sense toward the dogma of career education, the second version in the positive sense. For an example of a bipolar item, see figure 4.

Positive Form - Before graduation, every student should have some sort of "work" experience.
Negative Form - Students should wait until after graduation to get real "work" experiences.

figure 4 - Bipolar Item

2. Insure that items "capture the shades of meaning" of each stratum.

In this case, the initial pool of items was compared to the completed and validated substratification of career education. Each item was paired with the expected student outcome in the outline to which the item was judged to correspond. Of the several hundred items initially constructed, all logically paired with one or more substrata elements. This result provided still further evidence of the validity and comprehensiveness of the stratification developed in Phase I. A number of elements remained, however, without corresponding bipolar items. The fact that the pool of items was exhausted by the stratification whereas the stratification was not exhausted by the pool of items, implies that the item pool which had been constructed by traditional means did not completely represent all aspects of career education and that, had the item building process stopped at this point, the resulting instrument would not have comprehensively addressed the broad construct of career education. In each case at least one bipolar item was then constructed specifically to measure those remaining elements in the outline. If the outline actually and exhaustively represented the content of career education, as the first validation panel agreed it did, then the item pool at this point should fully reflect the content of career education.

3. Edit the items for clarity, ambiguity, and reading level, holding in mind the target population.

4. Determine the number of items desired on the final instrument and randomly select at least twice that number from the item pool.

For the purpose of this study, it was planned to retain fifteen (15) items for each component, so thirty trial items were selected for the initial instrument. Use of the negative or positive version of the item was also determined randomly at this point.

5. Submit this initial version of the instrument to a second panel of judges to determine whether it adequately and accurately addresses the construct as defined by the previously validated stratification. This step, combined with Phase I form the basis for the claim of construct validity.

6. Administer the trial instrument thus obtained to a subset of the population for whom the instrument is to be used.

7. Total all the items originally written to measure each respective major stratum to provide stratum subscores. Then total all the items to provide a total score.

8. Intercorrelate each item with all stratum subscores and the total score.

9. Any item which does not significantly correlate with both its own stratum subscore and the total score should be deleted.

10. Any item which correlates higher with the subscore of any stratum other than its own should be considered for reclassification or deletion.

11. From the remaining items, select those to be retained on the final instrument based upon item-to-own-subscore correlation and item-to-total score correlation, or any other set of logically defensible, predetermined criteria deemed appropriate by the researcher.

12. In general, approximately half the selected items should be negative and half positive.

Phase III - item cluster analysis

1. Administer the instrument to a second subset of the target population.

2. Compute item-to-subscore and item-to-total score correlations for all items and all strata subscores, see Table 1.

Table 1 - Product-Moment Correlations for Stratum I Items in Final Instrument with all Stratum Subscores and Total Score*** N=155

Item Number	I	II	III	IV	V	TOTAL
1	.3561	.1383	.1789	.1766	.1073	.2261
2	.4338	.2788	.2714	.2847	.2956	.3741
3	.4030	.2247	.1556	.1665	.2341	.2795
.						
.						
.						
15	.4230	.2658	.2757	.3202	.2828	.3760
$\bar{r}$	.3930*	.2274**	.2237**	.2204**	.1893**	.2981

* Within-component $\bar{r}$

** Differs from within-component $\bar{r}$ at .05 level of significance

*** This table is taken directly from Camp (1977). It represents intercorrelations between each of fifteen items in stratum I with each of the five strata subscores and the overall total from an adminstration of an actual instrument developed by this technique. For example, the correlation between item number 3 in stratum I (see figure 1) and the total score for stratum I was .40, while the correlation between that same item and the stratum V total score was .23.

3. Compute the mean of the item-to-subscore correlations for all items in stratum I with each of the stratum subscores, see $\bar{r}$ line in Table. The within-stratum correlation mean is then compared to each of the between-strata correlation means respectively. If the within-stratum correlation mean is significantly greater than each of the between-strata means, then the conclusion is drawn that stratum I is relatively independent and homogeneous, thus providing further evidence of the validity of both the original stratification developed in Phase I and the instrument developed in Phase II.

4. The same process is repeated for all the items in each respective stratum.

5. If the stratum correlation means are not found to be significantly different, the conclusion of relative stratum independence and homogeneity cannot be drawn. This alone would not be adequate cause for discarding the instrument. The claim could still be made of both content validity and construct validity based upon the construction procedure as previously outlined.

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